

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
3 February 2005 (03.02.2005)

PCT

(10) International Publication Number
WO 2005/010797 A3

(51) International Patent Classification⁷: G06G 7/48

(21) International Application Number:
PCT/US2004/023456

(22) International Filing Date: 22 July 2004 (22.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/489,460 23 July 2003 (23.07.2003) US

(71) Applicant and

(72) Inventor: LEE, Wook, B. [US/US]; 2727 Saint Anne's
Drive, Sugarland, TX 77479 (US).

(74) Agent: SHARPER, Sue, Z.; 1800 West Loop South, Suite
750, Houston, TX 77027 (US).

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,

GB, GD, GI, GJ, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

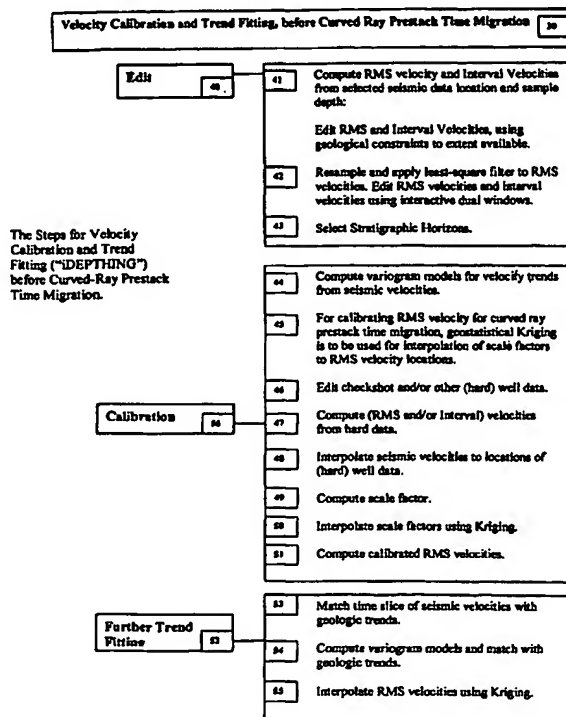
Published:

— with international search report

(88) Date of publication of the international search report:
7 April 2005

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: IMPROVED 3D VELOCITY MODELING, WITH CALIBRATION AND TREND FITTING USING GEOSTATISTI-
CAL TECHNIQUES, PARTICULARLY ADVANTAGEOUS FOR CURVED-RAY PRESTACK TIME MIGRATION AND FOR
SUCH MIGRATION FOLLOWED BY PRESTACK DEPTH MIGRATION



(57) Abstract: A method of constructing a 3D geologically plausible velocity model for efficient and accurate prestack imaging wherein embodiments of the invention provide: (1) a method of calibrating velocity functions (20), appropriately and efficiently taking into account well (hard) and seismic (soft) data as well as geological features, and trend fitting (22) ("iDEPTHing") RMS velocities before curved-ray prestack time migration; (2) a method of calibrating (56) and trend fitting ("iDEPTHing") interval velocities before prestack depth migration, appropriately and effectively taking into account well (hard) and seismic (soft) data as well as geological features; and (3) a method of constructing a geologically plausible velocity model (60) using the previous steps of velocity calibration and trend fitting RMS and interval velocities, for efficient sequential use in prestack time migration followed by prestack depth migration. Advantages of the embodiments include providing a quick turnaround for prestack time and depth migration to interpreters and cutting back resource-intensive interpretation efforts for 3D seismic data. The invention has significant implications for improving aspects of oil and gas exploration and production technologies, including pore pressure prediction, prospect evaluation and seismic attribute analysis.

WO 2005/010797 A3